

## **What is the Relationship Between the Exchange Rate and Oil Prices?**

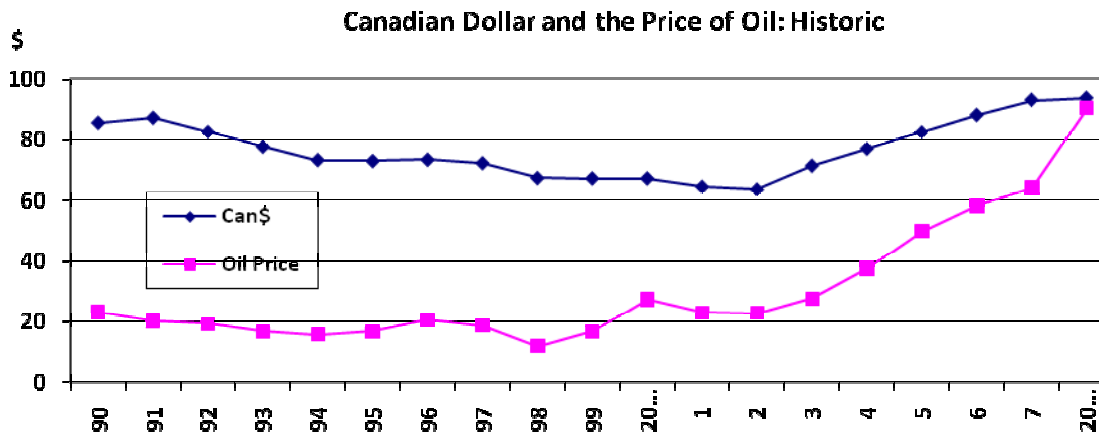
As we move into economic recovery over the next several years the economic performance of both Canada and the U.S. depend critically on the path of energy prices and the impact of energy prices on the value of our currencies. Over the 1970's and 1980's it was fairly clear to economists what the relationship was between the Canada/US exchange rate and the price of oil. The empirical relationship followed fairly closely to what economic theory would have suggested. However, today things are much more complicated. Some of the historic relationships seem to be changing, or taking a break, or taking a back seat. As financial markets play a bigger role in the performance of our economies, some relationships seem to be taking a higher profile. Some of these relationships make it very difficult to determine the net ultimate impact of a change in the price of oil on the Canadian or U.S. dollar. Importantly, some of the relationships could cause economic instability.

### **The Fundamental Economic Relationship**

For many years Canada has been a net exporter of oil and the U.S. a net importer of oil. International trade theory indicates that when the price of an export rises, if the demand for that export is very inelastic, ( i.e. quantities demanded hardly fall at all when the price is increased, as is the case for oil) this produces a demand for your currency driving up the value of your currency. This is referred to as a terms of trade effect. Export earnings have increased with no significant impact on import costs. This favorable terms of trade impact on the oil exporter such as Canada puts upward pressure on that country's currency. Note the terms of trade impact results from the impact on the nominal value of export revenues, not the actual quantities of units traded.

Of course prices can be driven up by either an increase in demand or a reduction in supply. It is clear that this positive relationship between oil prices and the Canadian dollar would apply when oil prices were driven up by an increase in the global demand for oil due to increased global growth. However, the same impact on the Canadian dollar results if there is a reduction in the supply of oil from oil exporters other than Canada. For example, even if OPEC were to restrict the supply of oil, with global demand stable, this also represents an increase in the demand for oil from Canada, and clear upward pressure on the Canadian dollar.

Alternatively, if there were a disruption in the supply of oil to markets due to a disruption in the oil fields of any one of the major producers (Iraq, Nigeria, Russia, Venezuela), as so often happens, this also represents an increase in the demand for oil facing Canada. In this instance, the increased price of oil would also be expected to put upward pressure on the Canadian dollar.



*Oil price is a US\$ index of the cost of domestic crude in the US.*

Based on the fundamentals above, an increase in the price of oil was clearly expected to result in increased oil export revenues from Canada and increased import costs for the U.S. In such case it is clear from the initial terms of trade perspective that an increased price of oil would result in an appreciation of the Canada U/S exchange rate. However, the relationship between the price of oil and the Canadian dollar is much more complex than the initial terms of trade impacts would suggest.

### **Some Other Direct and Indirect Impacts**

There are at least four important additional factors which must be taken account of before determining the final net impact of an increase in the price of oil on the Canadian dollar. First, and most important, slower economic growth in the U. S. and other net oil importing countries, such as Japan and most European countries, causes a reduction in the demand for exports from Canada to these countries.

This is an important impact, partially offsetting the initial positive terms of trade impact of an increase in oil prices on the Canadian dollar.

A second indirect impact on the Canadian dollar of an increase in oil prices is an international financial markets impact. When the economies of the oil importing countries are weakened by an increase in oil prices this can weaken global growth and cause instability and fears in international capital markets. When fears and disruptions hit international capital markets, funds flee to the safe haven of the U.S. dollar. This flow of funds into the U.S. dollar puts upward pressure on the U.S. dollar relative to most other

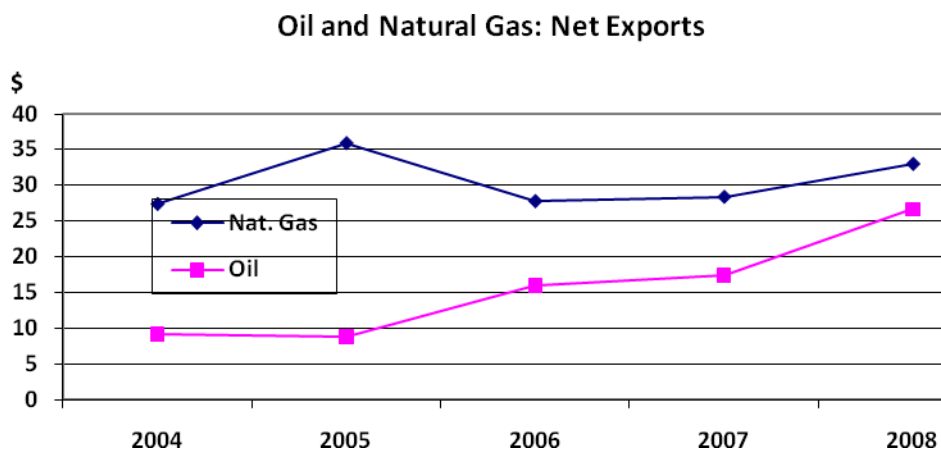
currencies, including the Canadian dollar. This impact could be significant, and at times probably is a significant offsetting impact to the original terms of trade impact.

The third additional impact on the exchange rate of an increase in the price of oil is that the increased price of oil raises the cost of doing business in the energy intensive sectors of both Canada and the U.S., especially in the transportation sector. Increased transport costs and the increase in prices of oil products to other sectors such as chemicals, causes economic growth to slow. This means the positive impact on growth in Canada's energy sector of an increase in oil prices has an important offsetting impact, raising the costs of the oil using sectors. In some instances Canada's exports of energy intensive goods is harmed by higher oil prices. Due to higher transport costs, our cost of importing goods ( eg. fruits and vegetables) is increased. Our cost of importing energy intensive goods is particularly increased. The net impact of this phenomenon on the exchange rate is the complex result of the competitive positions of many Canadian and foreign industries, therefore the final net impact on the exchange rate is rather small.

A fourth additional impact on the Canadian economy of an increase in oil prices is the direct and indirect impact of higher gasoline prices. Increased gasoline prices to the Canadian motorist act like a "giant sucking machine" taking funds that would otherwise be available for other consumer expenditures. As well, increased gasoline prices do noticeably reduce the auto vacations of Americans to Canada. The impact of higher gasoline prices on U.S. consumers, reduces their expenditures on other items, some of these other consumer items would have been imports into the U.S. from Canada. All considered, the direct and indirect impacts of higher gasoline prices have a modest negative impact on the Canadian dollar.

### **The Impact of Increased Natural Gas Exports**

The impact on our exchange rate of a change in the price of a traded good or service depends on the value of the net exports of that item. Canada has been a significant producer of oil for decades, but we have always consumed much of the oil we have produced and have always imported some oil into eastern Canada, leaving the net export of oil far short of total production. The balance between production, exports and imports is much different for natural gas. With completion of more pipelines to the U.S. we are now exporting much more natural gas than was the case in the 1980's. Imports of natural gas have always been negligible. For many years, the value of Canada's net exports of natural gas have exceeded the net exports of oil. In fact, in 2005 net exports of natural gas ( \$35 billion) exceeded net exports of oil (\$9 billion) by a whopping \$26 billion. In such case, a change in the price of natural gas has an even more important impact on the value of Canada's exports than an increase in the price of oil (assuming the demand for both oil and natural gas is very inelastic).

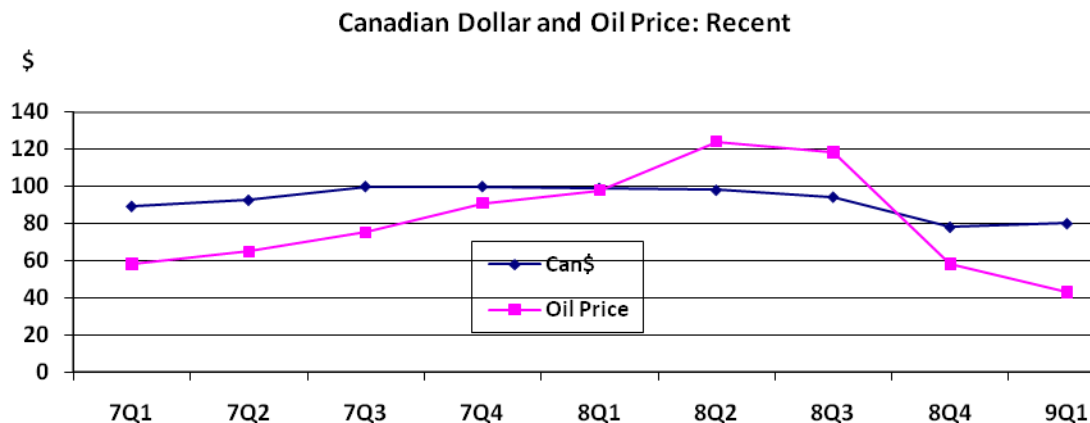


One of the major determinants of the price of natural gas is the price of oil. In many instances (commercial heating) natural gas is a substitute for oil and in oil sands production, natural gas is used in the production of oil. The price of natural gas is also dependent heavily on the weather, with nothing better to stir the demand for Canada's natural gas exports than a cold winter in the U.S. We conclude however by noting that one of the most important impacts of a higher price of oil on the Canadian dollar is its role in driving up the price of natural gas. In fact, the impact of a higher price of oil on the Canadian dollar depends critically upon whether the higher price of oil has, in this instance, also driven up the price of natural gas.

Over the past decade, unlike in the 1970's and 1980's, an increase in the price of oil has become more clearly associated with upward pressure on the Canadian dollar. In recent years this association has become positive and more significant, most likely due to the increased importance of net natural gas exports.

### **How Does it Finally All Fit Together?**

Over the 1970's and 1980's, the offsetting factors noted above completely offset the fundamental positive terms of trade relationship between higher oil prices and the Canadian dollar. Economic models generally found a negative, but sometimes insignificant relationship between energy (or oil) prices and the Canadian dollar. This weak relationship between energy (or oil) prices and the Canadian dollar was clearly due to the offsetting impacts unique to energy prices, noted above, since the relationship between stronger prices of other non-energy commodities which Canada exports (forestry products, nickel, gold, aluminum, wheat) and the Canadian dollar was strongly positive. If the stronger price of oil is due to a general stronger demand for commodities, then the Canadian dollar will most certainly strengthen. However, in this case the Canadian dollar appreciation would be partly due to the higher price of oil and very much due to the correlated increases in the prices of other commodities. Over the past decade the final net impact of higher oil prices on the Canadian dollar has moved more clearly into positive territory.



### *Price of Oil is WTI US\$*

It is important to note that movements of the Canadian dollar, like so many prices in the economy (eg. inflation, stock prices) is really influenced by expectations. If a change in the price of oil is considered to be very temporary it may not significantly impact the exchange rate. This could be why the Canadian dollar did not appreciate sharply as the price of oil rose to a temporary peak close to \$150 in July 2008. If higher oil prices were expected to be maintained over the longer term, providing impacts on business investment, beyond the short term terms of trade impact, then a sustained significantly higher oil price would lead to more significant upward pressure on the Canadian dollar.

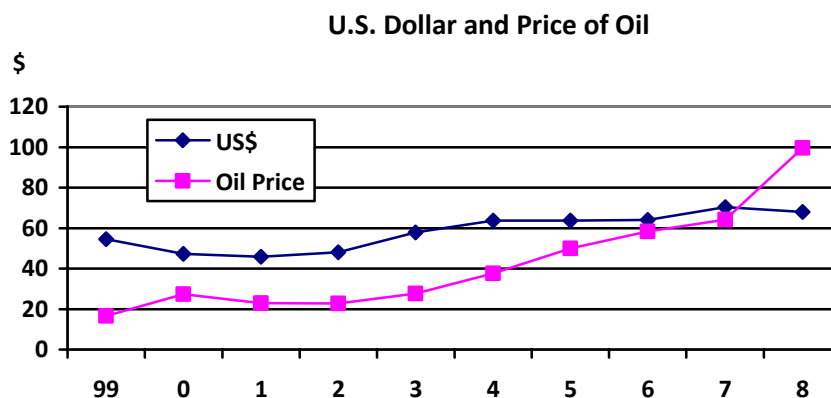
## **The Changing Role of Oil Prices and the U.S. Dollar**

Understanding any and all impacts of a change in the price of oil on the U.S. dollar is of course critical to Canadians since the value of the Canadian dollar is most often simply considered to be the number of U. S. cents required to buy one Canadian dollar. Until several years ago most economists thought they understood the fundamental relationship between the price of oil and the U.S. dollar. As explained above, the U.S. has long been a net importer of oil. With the demand for oil being very inelastic, an increase in the price of oil implies an increase in the value of imports into the U.S. Due to the terms of trade effect, the higher price of oil causes an increase in the value of U.S. imports, putting downward pressure on the U.S. dollar. This relationship has solid support in both economic theory as well as empirical observation. This puts downward pressure on the U.S. dollar relative to other currencies less dependent on oil imports, particularly the Canadian dollar.

## Relationships Between the Price of Oil and the U.S. Dollar Through Financial Markets

Over the past few years several relationships between the price of oil and the U.S. dollar have been given high profile in the financial press. In fact, some of these relationships may have existed for decades and some of them may be insignificant or temporary. These theories seem to be given more profile in the financial press than by economists. In any case, these newly profiled financial market relationships do have some empirical support. If they are significant and enduring relationships they deserve careful examination, since they will have a significant impact on U.S. and Canadian economic performance and the Canada/US exchange rate.

The positive offsetting impact on the U.S. dollar due to international capital flows seeking the relatively safe haven of the U.S. dollar in an oil price crisis addressed earlier, would, by most analysis, generally still leave a final net negative impact of a higher oil price on the U.S. dollar, except perhaps in an oil price crisis.



*U.S. dollar cost in euros. Oil price is a US\$ index of the cost of domestic crude in the US.*

The theories of the relationship between the U.S. dollar and the price of oil receiving a higher profile in the financial press recently, note the strong negative association between the price of oil and the U.S. dollar, but argue that the causal relationship is the reverse of the fundamental economic relationship. That is, these theories argue that a lower U.S. dollar causes a higher price of oil. Several reasons are given for a lower U.S. dollar causing a higher price of oil. Recall that it is always much more difficult to establish cause and effect in economic analysis than it is to establish a positive association between two variables.

### ***Lower U.S. Dollar Makes Oil More Affordable***

The price of oil (WTI) is denominated in U.S. dollars. Therefore, when the U.S. dollar falls relative to the currency in another country, the price of oil is actually lower in that other country. Not surprisingly, that country can be expected to purchase slightly more oil when the price to it is lower. For example, when the Canada/U.S. exchange rate strengthens (eg. the U.S. dollar has weakened for whatever reason), at an unchanged price of oil in U.S. dollars, the quantity of gasoline demanded in Canada at the lower Canadian dollar price, would increase slightly. With all countries not on the U.S. dollar demanding a higher quantity of oil as a response to the weaker U.S. dollar, the weaker U.S. dollar would therefore put upward pressure on the price of oil.

This impact seems to have a reasonable theoretical foundation. However, it is probably a minor impact relative to the more fundamental negative terms of trade relationship. As countries outside the U.S. significantly increase their automobile ownership and otherwise increase their energy consumption, this relationship could well be growing in importance as a longer term trend however.

### ***OPEC Wants to Re-Attain its U.S. Dollar Earnings***

Another argument that a lower U.S. dollar actually causes a higher price of oil goes as follows. The OPEC countries have a significant control over the supply of oil. These countries want to return a target amount of funds in their currencies from their oil exports so they can meet their government budgets and income for their citizens. If the price of oil in U.S. dollars falls, then the OPEC countries will collect less U.S. dollars for their export of oil. This is, of course, a particular problem for those OPEC countries that rely heavily on imports from countries other than the U.S. They therefore are influenced to cut the supply of their oil to market to drive up the price of oil to re-establish their oil export earnings in U.S. dollars.

This theory has some logic to it. Clearly the market may have moved in this manner for this reason at several points in time in recent years. The ability of OPEC countries to enforce their supply objectives is sometimes shaky. However, this theory requires careful empirical examination to determine if this relationship between the price of oil and the U.S. dollar is a significant and enduring determinant of the price of oil.

### ***Traders Want a Hedge***

This theory of how a lower U.S. dollar causes a higher price of oil argues that the price of oil is an attractive hedge against the U.S. dollar. When the U.S. dollar is weak for whatever reason, derivatives traders will purchase oil contracts or futures as a hedge, given the predictable negative relationship between the U.S. dollar and the price of oil. This trading activity, in response to the weak U.S. dollar, will put upward pressure on the price of oil.

Likely traders have purchased oil futures as a hedge against a falling U.S. dollar. However, whether this is a significant or enduring relationship requires more careful study.

### **Watch Out for a Dangerous Dynamic**

As outlined above, the fundamental relationship between the U.S. dollar and the price of oil is that a higher price of oil causes a lower U.S. dollar due to the impact of the higher price of oil on the U.S. terms of trade. Each of the newly profiled theories outlined above argue that – each for different reasons – that a lower U.S. dollar causes a higher price of oil. If the newly profiled theories are significant and enduring, a dangerous dynamic could develop.

Assume that in the coming years the U.S. dollar falls relative to most major currencies due, for example, to the fear of the impact of the excessive public debt burden on U.S. economic performance. Now assume each of the newly profiled theories of how a weaker U.S. dollar causes upward pressure on the price of oil is significant and enduring. In such case the initial lower valued U.S. dollar will cause upward pressure on the price of oil. That is, in response to the weaker U.S. dollar, many countries will now demand more oil at the lower U.S. dollar price, OPEC will drive up the price of oil further to re-attain its income in US dollars, and traders will drive up the price of oil as a hedge against the weak U.S. dollar. That is, the weaker U.S. dollar has caused a higher price of oil. However, recalling the fundamental terms of trade relationship between the price of oil and the U.S. dollar, this higher price of oil will then cause further downward pressure on the U.S. dollar. We now have an “exploding cycle” here. If the U.S. dollar falls causing a higher price of oil and this causes the U.S. dollar to fall even further – when will it all end!

Let’s hope these newly profiled theories of how a lower U.S dollar can cause a higher price of oil are not significant or enduring. To the extent they are, this will hinder the ability of the U.S. economy to recover as the Americans attempt to deal with a higher cost of importing oil. Turning to Canada, the higher price of oil will increase the earnings in Canada’s energy sector, and over time could lead to more investment and output in the energy sector. However, the resultant higher Canadian dollar will hinder our non-energy exporters. This potential dangerous dynamic between the price of oil and the U.S dollar is a threat to economic growth in the U.S. However, to Canada it is less of a threat to our overall economic growth, but has serious implications for how and where income is earned amongst Canadians.

### **Conclusions**

- The price of oil will likely be subject to strong upside pressure as Canada, the U.S. and the global economy generally, move into recovery over the next several years.

- Since Canada is a net oil exporter the fundamental economic relationship calls for a higher price of oil to cause upside pressure on the Canadian dollar. Beyond the fundamentally positive relationship between the price of oil and the Canadian dollar, there are many other important relationships, some of them important offsets, some of them acting principally through indirect impacts on the U.S. dollar and therefore indirectly on the Canadian dollar.
- Most importantly these days, a higher price of oil drives up the Canadian dollar making our exports less competitive internationally. The higher oil price also reduces economic growth in many of our major trading partners, particularly the U.S. and Japan who are net energy importers. Weakness in these economies reduces the demand for our non-energy exports and our ability to recover from this recession.
- The relationships between the price of oil and the Canadian dollar are very complex and these relationships have been changing over time. Some of them work through international trade, some through financial markets. Some of them can cause troublesome dynamics. It is therefore critical to understand these relationships as best we can, particularly as we anticipate economic recovery.